cations that may be different from the selected best beam for uplink communications, depending on the circumstances. This provides an advantage because the best beam for communicating uplink signals from a mobile station may not always be the best beam for communicating downlink signals to that mobile station.

[0012] Still another technical advantage includes a smart antenna apparatus operable to select a best beam in real time. In other words, the smart antenna apparatus is operable to select a beam based on uplink signals received in a particular time slot and switch to that beam during the same time slot. Thus, the smart antenna apparatus is operable to select a best beam when receiving an initial communication from a mobile station, such as a random access channel (RACH) burst. This increases the effective range of a base station transceiver for identifying initial signals from a mobile station.

[0013] Other technical advantages are readily apparent to one skilled in the art from the following figures, descriptions, and claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] For a more complete understanding of the invention, and for further features and advantages, reference is now made to the following description, taken in conjunction with the accompanying drawings, in which:

[0015] FIG. **1** illustrates a wireless communication system including a smart antenna system and a base station in accordance with an embodiment of the present invention;

[0016] FIG. **2** illustrates the general architecture and operation of the smart antenna system of FIG. **1** including a smart antenna apparatus and an antenna unit;

[0017] FIG. **3** illustrates a receiving system of the smart antenna apparatus of FIG. **2**;

[0018] FIG. **4** illustrates a processing system of the smart antenna apparatus of FIG. **2**;

[0019] FIG. **5** illustrates a system for monitoring control signals being communicated from a base station transceiver to mobile stations and synchronizing the smart antenna apparatus with the base station transceiver using the control signals in accordance with an embodiment of the present invention;

[0020] FIG. **6** illustrates a method for monitoring control signals being communicated from a base station transceiver to mobile stations in accordance with an embodiment of the present invention;

[0021] FIG. **7** illustrates a method for synchronizing the smart antenna apparatus with the base station transceiver during start-up in accordance with an embodiment of the present invention;

[0022] FIG. **8** illustrates a method for maintaining the smart antenna apparatus in synchronization with the base station transceiver during steady-state operation in accordance with an embodiment of the present invention;

[0023] FIG. **9** illustrates a system for monitoring signaling information being communicated via an interface between a base station transceiver and a base station controller in accordance with an embodiment of the present invention;

[0024] FIG. **10** illustrates a method for monitoring signaling information being communicated via the interface illustrated in FIG. **9**;

[0025] FIG. **11** illustrates a system for determining beam selections with the smart antenna apparatus of FIG. **2**;

[0026] FIG. **12** illustrates a system for determining fast decision beam selections in accordance with an embodiment of the present invention;

[0027] FIG. **13** illustrates a method for determining fast decision beam selections in accordance with an embodiment of the present invention;

[0028] FIG. **14** illustrates a system for controlling the gain settings for each beam receiver for determining fast decision beam selections in accordance with an embodiment of the present invention;

[0029] FIG. **15** illustrates a method for controlling the gain settings for each beam receiver for determining fast decision beam selections in accordance with an embodiment of the present invention;

[0030] FIG. **16** illustrates a system for determining smart decision beam selections including a smart decision beam selection module in accordance with an embodiment of the present invention;

[0031] FIG. **17** illustrates the architecture and operation of the smart decision beam selection module of FIG. **16** in accordance with an embodiment of the present invention;

[0032] FIG. **18** illustrates a method for determining smart decision beam selections in accordance with an embodiment of the present invention;

[0033] FIG. **19** illustrates a correlation module for determining a correlation quality of each uplink beam for use in determining smart decision beam selections in accordance with an embodiment of the present invention;

[0034] FIG. **20** illustrates a method for determining a correlation quality uplink beams by correlating a signal sequence in each uplink beam with one or more known training sequences in accordance with an embodiment of the present invention;

[0035] FIG. **21** illustrates a method for determining a correlation quality uplink beams by correlating a signal sequence in each uplink beam with one or more known training sequences in accordance with an embodiment of the present invention;

[0036] FIG. **22** illustrates a system for determining whether to use a fast decision beam selection or a smart decision beam selection for a particular time slot in accordance with an embodiment of the present invention; and

[0037] FIG. **23** illustrates a method for determining whether to use a fast decision beam selection or a smart decision beam selection for a particular time slot in accordance with an embodiment of the present invention.

DETAILED DESCRIPTION OF THE DRAWINGS

[0038] Example embodiments of the present invention and their advantages are best understood by referring now to FIGS. **1** through **23** of the drawings, in which like numerals refer to like parts.